Claims

1. A system for creating a customized drug library for an electronically loadable drug infusion pump, said system comprising:

a drug library containing a plurality of drug entries, there being associated with each drug entry a set of associated drug delivery parameters and/or drug delivery protocols for configuring the drug infusion pump;

means for selecting a set of drug entries from among said plurality of drug entries in said drug library;

means for adding the selected drug entries along with the sets of drug delivery information associated therewith to a customized library; and

loading means for causing the system to electronically load said customized library into the drug infusion pump.

2. The system of claim 1 wherein each of the associated sets of drug delivery parameters includes information selected from a group of parameters including drug concentration, drug delivery rate, drug dose, and bolus size.

3. The system of claim 2 wherein the said group of parameters includes minimum, default and maximum drug delivery rate.

4. The system of claim 2 wherein the said group of parameters includes minimum, default and maximum dose.

5. The system of claim 2 wherein the said group of parameters includes minimum, default and maximum bolus size.

6. The system of claim 2 wherein the said group of parameters includes maximum bolus rate.

7. The system of claim 1 further comprising means for creating a drug configuration within the customized library that does not exist in the drug library.

8. The system of claim 1 further comprising means for editing an existing drug configuration in the customized library.

9. The system of claim 1 further comprising a graphical tool that generates a graph for display on a computer screen, said graph enabling the user to select an appropriate drug concentration for a given body weight.

10. The system of claim 9 wherein said graph is a two-dimensional log-log graph wherein one axis is body weight and the other axis is fluid flow rate.

11. The system of claim 9 wherein one or more curves are plotted on said graph, said one or more curves being for a given drug concentration and different doses.

12. The system of claim 11 wherein the one or more curves are of the form:

$$Body\ Weight = Rate \times \frac{Concentration}{Dose} \times K\ ,$$

where K is a positive number.

13. The system of claim 11 further comprising means for moving said one or more curves about on said graph.

14. The system of claim 1 further comprising a list of available mode options, means for identifying one or more modes from said list of available mode options and means for adding said identified modes to said customized library, said modes specifying the units available for expressing the drug delivery information and said identified modes being the modes that will be available in the infusion pump when said customized library is loaded into said infusion pump.

15. The system of claim 14 wherein said available mode options include milliliter/hour, units/hour, micrograms/minute, and micrograms/kilogram/minute.

16. The system of claim 1 further comprising a list of names of syringe manufacturers, means for selecting names of syringe manufacturers from said list of names of syringe manufacturers and means for adding said selected names of syringe manufactures to said customized library, said selected names of syringe manufacturers identifying syringes that can be used in the drug infusion pump when said customized library is loaded into said infusion pump.

17. The system of claim 1 further comprising a list of syringe sizes, means for one or more syringe sizes from said list of syringe size and means for adding said selected syringe sizes to said customized library, said selected syringe sizes identifying syringes that can be used in the drug infusion pump when said customized library is loaded into said infusion pump.

18. The system of claim 1 further comprising means for representing a set of features within the customized library, each of which can be toggled on or off, and means for toggling on or off each of said features.

19. The system of claim 18 wherein said set of features includes a drug library enable flag, wherein the drug library enable flag either enables or disables, depending upon the condition of the drug library enable flag, access to the drug entries within the customized library when the customized library is loaded into said drug infusion pump.

20. The system of claim 18 wherein said set of features includes a syringe recognition flag, wherein the syringe recognition flag either enables or disables, depending upon the condition of the syringe recognition flag, a syringe recognition capability within said drug infusion pump when the customized library is loaded into said drug infusion pump.

21. The system of claim 18 wherein said set of features includes a syringe detection flag, wherein the syringe detection flag either enables or disables, depending upon the condition of the syringe detection flag, a syringe detection capability within said drug infusion pump when the customized library is loaded into said drug infusion pump.

22. The system of claim 18 wherein said set of features includes a volume limit detection flag, wherein the volume limit flag either enables or disables, depending upon the condition of the volume limit flag, a function within the pump that enables the user to specify a volume limit for

a drug delivery configuration when the customized library is loaded into said drug infusion pump.

23. The system of claim 1 further comprising means for causing said system to read pump configuration information from the drug infusion pump.

24. The system of claim 1 wherein said means for selecting is normally disabled and said system further comprises password protection logic that serves to enable said selection means but only if a system user supplies a preselected password to said password protection logic.

25. The system of claim 24 wherein there are defined a plurality of access levels, each of said access levels corresponding to a different set of access privileges for said system and wherein said system further comprises a table associating each of a plurality of users with a corresponding one of said plurality of access levels and wherein said password protection logic uses said table to assign access privileges to the system user.

26. The system of claim 1 further comprising an access control means for controlling access to said loading means, wherein said access control means permits access to said loading means if a system user satisfies a set of preconditions and denies access to said loading means if the system user fails to satisfy the set of preconditions.

27. The system of claim 26 wherein said access control means comprises a sign-off table for recording a sign-off and wherein said access control means permits access to said loading means if a valid approval sign-off

exists in said sign-off table and denies access to said loading means if a valid approval sign-off does not exist in said sign-off table.

28. The system of claim 27 wherein the sign-off table includes an system user name and a system user date and time and an approval name and an approval date and time, wherein said system user date and time records when a last modification of said customized file by said system user occurred and wherein said access control means permits access to said loading means if said approval date and time is later than said system user date and time and denies access to said loading means if said approval date and time is later than said system user date and time.

29. A system for use with a computer, said system comprising:

a storage medium containing a drug library, said drug library containing a plurality of drug entries, there being associated with each drug entry a set of associated drug delivery information for configuring a programmable drug infusion pump, said storage medium being readable by the computer,

a program that runs on said computer, said program comprising:

means for enabling a user of said computer to select a set of drug entries from among said plurality of drugs entries in said drug library;

means for enabling the user to add the selected drug entries along with the sets of drug delivery information associated therewith to a customized library; and

means for enabling the user to cause said computer to electronically load the customized library into the drug infusion pump.

30. The system of claim 29 further comprising means for enabling the user to create a drug configuration within the customized library that does not exist in the drug library.

31. The system of claim 29 further comprising means for enabling the user to edit an existing drug configuration in the customized library.

32. The system of claim 29 further comprising a graphical tool that generates a graph for display on a computer screen, said graph enabling the user to select an appropriate drug concentration for a given body weight.

33. A drug infusion pump for use with a container containing a particular drug, said pump comprising:

a drive mechanism for causing the particular drug to be delivered to a patient from the container;

a programmable controller controlling the drive mechanism;

an electronically loadable memory inside the pump;

input circuitry through which the electronically loadable memory can be electronically loaded with a drug library, said drug library containing a plurality of drug entries, there being associated with each drug entry a set of associated drug delivery parameters and/or drug delivery protocols for configuring the drug infusion pump;

a user interface enabling a user to program the programmable controller, said user interface comprising:

means for enabling the user to select a drug entry from the electronically loaded drug library; and

means for configuring the programmable controller with the set of drug delivery parameters associated with the selected drug.

34. The drug infusion pump of claim 33 wherein said container is a syringe and said drive mechanism operates said syringe.

35. The drug infusion pump of claim 33 wherein said electronically loadable memory is non-volatile memory.

36. The drug infusion pump of claim 35 wherein said electronically loadable memory is EEPROM.

37. The drug infusion pump of claim 33 wherein said user interface comprises a control panel through which the user can program the programmable controller and a display screen for displaying drug entries from the drug library.

38. The drug infusion pump of claim 33 wherein each of the associated sets of drug delivery parameters includes information selected from a group of parameters including drug concentration, drug delivery rate, drug dose, and bolus size.

39. The drug infusion pump of claim 38 wherein the said group of parameters includes minimum, default and maximum drug delivery rate.

40. The drug infusion pump of claim 38 wherein the said group of parameters includes minimum, default and maximum dose.

41. The drug infusion pump of claim 38 wherein the said group of parameters includes minimum, default and maximum bolus size.

42. The drug infusion pump of claim 38 wherein the said group of parameters includes maximum bolus rate.

43. The drug infusion pump of claim 33 wherein said electronically loaded drug library contains a list of available mode options, said mode options specifying the units available for expressing drug delivery information, and wherein said drug infusion pump offers the user the list of available mode options from which to make a selection when the electronically loaded drug library is in said pump.

44. The drug infusion pump of claim 43 wherein said list of available mode options includes selection made from the group including milliliter/hour, units/hour, micrograms/minute, and micrograms/kilogram/minute.

45. The drug infusion pump of claim 33 wherein said electronically loaded drug library contains a list of names of syringe manufacturers, said names of syringe manufacturers identifying syringes that can be used in the drug infusion pump, and wherein said drug infusion pump offers the user the list of names of syringe manufacturers from which to make a selection when the electronically loaded drug library is in said pump.

46. The drug infusion pump of claim 33 wherein said electronically loaded drug library contains a list of syringe sizes, said selected syringe sizes identifying syringes that can be used in the drug infusion pump, and wherein said drug infusion pump offers the user the list of syringe sizes from which to make a selection when the electronically loaded drug library is in said pump.

47. The drug infusion pump of claim 33 wherein said electronically loaded drug library contains a set of features, each of which is either be toggled on or off, and wherein said drug infusion pump offers the user only the features from among the set of features that are toggled on when the electronically loaded drug library is in said pump.

48. The drug infusion pump of claim 47 wherein said set of features includes a drug library enable flag, wherein the drug library enable flag either enables or disables, depending upon the condition of the drug library enable flag, access to the drug entries within the drug library in said drug infusion pump.

49. The drug infusion pump of claim 47 wherein said set of features includes a syringe recognition flag, wherein the syringe recognition flag either enables or disables, depending upon the condition of the syringe recognition flag, a syringe recognition capability within said drug infusion pump when the drug library is in said drug infusion pump.

50. The drug infusion pump of claim 47 wherein said set of features includes a syringe detection flag, wherein the syringe detection flag either enables or disables,

depending upon the condition of the syringe detection flag, a syringe detection capability within said drug infusion pump when the drug library is in said drug infusion pump.

51. The drug infusion pump of claim 47 wherein said set of features includes a volume limit detection flag, wherein the volume limit flag either enables or disables, depending upon the condition of the volume limit flag, a function within the pump that enables the user to specify a volume limit for a drug delivery configuration when the drug library is loaded in said drug infusion pump.

52. A drug infusion pump for use with a container containing a given drug, said container including a machine readable label, the label specifying an identifier of the given drug and possibly other information about the given drug, said pump comprising:

a drive mechanism for causing the given drug to be delivered to a patient from the container;

a programmable controller controlling the drive mechanism;

a memory for storing a drug library, said drug library containing a plurality of drug entries, there being associated with each drug entry a set of associated drug delivery parameters for configuring the drug infusion pump;

a label reader for reading the contents of the label on the container;

means responsive to the label reader for identifying an entry in the drug library that corresponds to the given drug;

means for configuring the programmable controller by using the set of drug delivery parameters associated with the identified entry from the drug library; and

means for causing the controller to run the drive mechanism using the set of drug delivery parameters associated with the identified entry from the drug library.

53. The drug infusion pump of claim 52 wherein said container is a syringe and said drive mechanism operates said syringe.

54. The drug infusion pump of claim 52 wherein said machine readable label is a touch memory.

55. The drug infusion pump of claim 52 wherein said configuring means also uses information from said label to configure the programmable controller.

56. The drug infusion pump of claim 52 wherein the label includes an expiration date for the given drug and wherein said pump further comprises:

an internal clock indicating a current date;

means for comparing the expiration date as read by the label reader to the current date as indicated by the internal clock; and

means for issuing a warning if the current date is later than the expiration date.

57. The drug infusion pump of claim 56 further comprising means for preventing the controller from running the drive mechanism if the current date is later than the expiration date.

58. A drug infusion pump for use with a container containing a given drug, said pump comprising:

a drive mechanism for causing the given drug to be delivered to a patient from the container;

a programmable controller controlling the drive mechanism;

a memory containing an event log;

means for configuring the programmable controller to deliver the given drug in accordance with a set of drug delivery parameters;

a user interface for operating the pump; and

means for creating in the event log a sequence of event records, each event record documenting a different event in the operation and/or programming of the pump.

59. The drug infusion pump of claim 58 wherein the events that are recorded in said event log include occurrences of alarms, said alarms warning of a problem requiring user attention.